NORTHERN ILLINOIS UNIVERSITY

"Musculoskeletal Rehabilitation for Breast Cancer Post-Reconstruction Surgeries"

A Thesis Submitted to the

University Honors Program

In Partial Fulfillment of the

Requirements of the Baccalaureate Degree

With University Honors

Department of Allied Health Professions

By Kristin Arialis

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HONORS THESIS ABSTRACT
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HONORS THESIS ABSTRACT

I have proposed a set of musculoskeletal rehabilitation protocols.. for the different types of post-reconstruction surgeries for breast cancer patients. Breast cancer is the leading cause of cancer deaths.. among women ages 40-59. Most breast cancer disease patients require a mastectomy procedure in which the entire breast tissue is removed. In addition, many women opt to have the missing breast reconstructed, using tissue from another part of their body to supplement the breast tissue taken out during the mastectomy. Since muscle tissue is removed from one part of the body and transposed to another part of the body, it is important to become aware of the possible functional deficits at both the transposed muscle site and the donor site. It is therefore important for the post-reconstruction patients to seek physical therapy for rehabilitation of the donor site and transposed tissue site. I have researched the various types of mastectomy and reconstruction surgeries available to breast cancer patients using research books and journals. From the research obtained, I have proposed a set of rehabilitation protocols for each type of reconstruction surgery, including possible complications associated with various types of reconstruction techniques and how they can hinder the rehabilitation process. Pictures are included as an appendix to enhance the protocols..

HONORS THESIS ABSTRACT

I have proposed a set of musculoskeletal rehabilitation protocols for the different types of post-reconstruction surgeries for breast cancer patients. Breast cancer is the leading cause of cancer deaths among women ages 40-59. Most breast cancer disease patients require a mastectomy procedure in which the entire breast tissue is removed. In addition, many women opt to have the missing breast reconstructed, using tissue from another part of their body to supplement the breast tissue taken out during the mastectomy. Since muscle tissue is removed from one part ofthe body and transposed to another part ofthe body, it is important to become aware of the possible functional deficits at both the transposed muscle site and the donor site. It is therefore important for the post-reconstruction patients to seek physical therapy for rehabilitation of the donor site and transposed tissue site. I have researched the various types of mastectomy and reconstruction surgeries available to breast cancer patients using research books and journals. From the research obtained, I have proposed a set of rehabilitation protocols for each type of reconstruction surgery, including possible complications associated with various types of reconstruction techniques and how they can hinder the rehabilitation process. Pictures are included as an appendix to enhance the protocols.

University Honors Program

Capstone Approval Page

Capstone Title: (print or type):

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Cancer Post-Reconstruction Surgeries

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Breast cancer is the leading cause of cancer related deaths among women ages 40 to 59. Many breast cancer patients opt to have a mastectomy procedure in which the breast tissue is surgically removed. In addition, many women choose to have the missing breast reconstructed, in most cases using muscle tissue from another part of their body to supplement the breast tissue taken out during the mastectomy. Since muscle tissue is removed from one part of the body and transposed to another part of the body, it is important to become aware of the possible functional deficits at both the transposed muscle site and the donor site. It is therefore possibly important for post-reconstruction patients to seek physical therapy for rehabilitation of the donor site and transposed tissue site.

Mastectomy is currently the most common treatment for breast cancer. There are several mastectomy procedures available, which are distinguished by the amount of breast tissue and other tissues that are removed. Factors considered when determining which procedure is most appropriate include tumor size and type, cancer stage, and lymph node involvement (Surgery 101, Mastectomy: Surgical Process). Age and overall health are also taken into account. The different types of mastectomy procedures include the simple (total), modified radical, radical, subcutaneous, partial, lumpectomy, and skin-sparing mastectomy. In the *simple (total) mastectomy,* the entire breast is removed, but the lymph nodes and surrounding muscle are left intact. The *modified radical mastectomy* entails the removal of the entire breast, the lymph nodes under the arm, and the lining over the chest muscles, yet the muscles remain intact. In a *radical mastectomy,* the breast, lymph nodes, muscles under the breast, and some of the surrounding fatty tissues are removed. Radical mastectomy is used in cases of extreme tumors and in cases

where cancer cells have invaded the chest wall.. In a *subcutaneous mastectomy*, the tumor and breast tissue are removed, but the nipple and overlying skin are left intact. Reconstruction surgery is easier in the subcutaneous mastectomy because the skin does not need to be reconstructed in addition to the breast tissue, but some cancer cells may still remain. In a *partial mastectomy*, a large amount of breast tissue and some skin are removed with the tumor. A partial mastectomy also includes removal of the lining over chest muscles below the tumor and, usually, some lymph nodes. In a *lumpectomy*, the tumor and a small amount of surrounding tissue are removed. Several lymph nodes may also be removed. Lastly, a *skin-sparing mastectomy* may be an option for some patients. During this procedure, the surgeon makes a much smaller incision circling the areola (the tissue surrounding the nipple). Even though the opening is smaller, the entire breast tissue is still removed.

For each type of mastectomy, every effort is made to leave as much healthy skin intact as possible. However, sometimes a substantial amount of skin is removed, resulting in large, possibly disfiguring scars, and the need for breast reconstruction (surgically creating a new breast mound).

Breast reconstruction after mastectomy has become popular over the last 20 or 30 years (Malata., 1456). Historically, almost all breast reconstructions were delayed for months or years after mastectomy for fear that immediate reconstruction would increase the risk of post-operative complications or mask recurrence of the cancer disease. Today, however, immediate breast reconstruction is preferred by patients due to the potential for a single operation and period of hospitalization (as compared to a separate surgery for the mastectomy and reconstruction). Immediate reconstruction also aids in the psychological

adjustment to the loss of a breast because the patient never sees the flatness from the missing breast mound; a new breast mound is substituted before the patient comes out of surgery.

Breast reconstruction can be divided into two main categories, prosthetic reconstruction and autogenous tissue reconstruction. Prosthetic reconstruction requires the insertion of an implant underneath the pectoralis muscle, a large muscle in the chest.. Autogenous tissue reconstruction requires a donor site muscle, skin, and/or fat tissue from the patient to be surgically removed and transposed to the breast site to create a new breast mound.

Prosthetic reconstruction includes implant reconstruction, classical expander-implant reconstruction, and adjustable implant reconstruction (Georgiade, 137). *Implant reconstruction* involves the insertion of a gel- or saline-filled prosthesis under the pectoralis major muscle. This procedure typically requires only one surgery. The *classical expander-implant reconstruction* entails a submuscular placement of an inflatable silicon balloon which is subsequently expanded by a series of postoperative saline injections through a remote port to create a breast mound of the desired dimensions, which takes several weeks. The temporary expander is then removed approximately four to six months later and replaced with a permanent saline-filled implant.. This procedure, however, requires two surgeries, one to insert the expander implant and one to remove the expander implant to insert the permanent implant.. The *adjustable implant reconstruction* (permanent expander-implant), on the other hand, entails the insertion of a prosthesis that has an adjustable saline- filled inner lumen surrounded by a silicone gel outer lumen. This prosthesis is permanent, thus eliminating

the need for a second surgery. In addition, the gel lining renders the implant more natural-feeling while the saline compartment allows for volume adjustment (138).

There are many different types of autogenous tissue reconstruction techniques. The most common autogenous tissue, or flap, procedures include transverse rectus abdominis myocutaneous (TRAM) flaps (derived from the rectus abdominal muscle), latissimus dorsi flaps (derived from the latissimus dorsi posterior shoulder muscle), and gluteus maximus flaps (derived from a portion of the major buttocks muscle). In general, flap techniques have longer operative times, increased morbidity, increased recovery time and postoperative pain. (Kroll, 106). However, autogenous tissue has tactile sensation more like breast tissue and can provide the natural ptosis that cannot be often duplicated with a breast implant. In addition, flaps develop sensory innervation from the nerve ingrowth into the mastectomy site whereas a breast implant cannot.

The *TRAM* flap utilizes the rectus abdominal muscle, a large, double-panneled abdominal muscle. The TRAM operation can be performed as a microvascular (containing blood vessels) free flap, a single pedicled flap (the flap remains attached at its origin and is tunneled up to the mastectomy site) utilizing one rectus muscle, or a double pedicled flap utilizing both rectus muscles. The flap choice is based on the surgeon's preference as well as the patient's specific situation. Patients who require a large volume of tissue may require a free flap or a doubled pedicled flap because a single pedicled flap may not be sufficient. However, double pedicled flaps require a sacrifice of both rectus abdominal muscles, which may leave the abdominal wall significantly weaker and therefore may not be preferred by patients. The microvascular free TRAM flap, on the other hand, offers less abdominal wall trauma than both the double and single pedicled

flap procedures, therefore abdominal wall function improves faster (yet function is equal at about six months) with the free flap. It should also be noted that the TRAM flap procedure can only be performed once (Marshall, 390). Therefore, patients who are at a high risk for bilateral (both sides) breast cancer should be advised that a unilateral (one sided) reconstruction using a single pedicled flap would prevent an additional reconstruction on the other side with the other intact rectus muscle at a later date.

The *latissimus dorsi flap* utilizes the latissimus dorsi muscle (a posterior shoulder muscle) as an island pedicle flap for breast reconstruction. The large, fan shaped muscle could be completely transposed anteriorly to replace the absent pectoralis major muscle (an anterior chest wall muscle that may be removed during the mastectomy procedure) and recreate the anterior axillary (armpit) fold, as well as provide a well vascularized muscle and skin envelope to receive an implant.. The skin island, when properly designed, can replace the skin removed during mastectomy procedure. In some cases, adequate fat tissue is available on top of the latissimus dorsi muscle and an implant is not required. When the TRAM flap is not an option for the patient because of lack of tissue, previous surgery, smoking, obesity, or diabetes mellitus, the latissimus dorsi flap is a good option (Guthrie, 92). The blood supply to the latissimus dorsi flap is excellent, even in patients with compromised circulation, such as with diabetes. This means that there is a smaller chance of flap necrosis (death of the flap).

The *gluteal free flap* (utilizing a portion of the gluteus maximus buttocks muscle) is typically considered a secondary, or tertiary choice for autogenous tissue breast reconstruction due to the increased operative time, complexity, and morbidity associated with the procedure (Hutchenson, 67). The patient considered for this procedure is usually

not a candidate for the TRAM flap, due possibly to insufficient tissue or abdominal scars. This procedure provides abundant tissue for reconstruction, minimal functional loss since only a small portion of the muscle is sacrificed, and an inconspicuous donor site (the buttocks). However, the gluteal flap is typically more difficult to harvest (as compared to the TRAM flap) and recipient vessel dissection is also more difficult (70).

Postoperative care for breast reconstruction varies among the type of reconstruction procedure performed. For prosthetic reconstructions, there will be a functional deficit at only one site, whereas for autogenous tissue reconstructions, there will be functional deficits at both the donor site and the recipient site. In either case, it is important to *seek* physical therapy to regain and maintain strength and flexibility to adequately proceed with everyday activities.

The following physical therapy routines for each type of breast reconstruction are proposed, based on general time frames for recovery and specific muscle deficiencies.

Prosthetic breast reconstruction postoperative care requires a limited use of the ipsilateral arm (the arm on the same side as the breast surgery) for two weeks after surgery and all range of motion exercises are delayed for this period of time (Karp, 5). This is done to allow time for the suture line to heal and to allow for proper settling of the prosthesis. Therefore, it is suggested that physical therapy begin two weeks postoperatively.

Within the first two weeks of therapy (weeks three through four after prosthetic reconstruction surgery), the sessions should consist of stretching exercises for the shoulder. Since there was a limited range of motion allowed within the first two weeks, the muscles of the shoulder will be weaker and tighter (the muscle units become tighter

when they are not stretched out through everyday motions). The physical therapist will manually stretch the patients shoulder gently and only to a limit within the patients pain tolerance. The shoulder will be stretched in the motions of forward flexion (the arm raised directly in front of the body to over the head, shown in Figure 1 in the appendix), abduction (the arm raised directly at the side of the body to over the head, shown in Figure in the appendix), diagonal (shown in Figure 3 in the appendix), internal rotation (elbow bent to ninety degrees and against the body while the hand is brought towards the body, shown in Figure 4 in the appendix), and external rotation (elbow bent to ninety degrees and against the body while the hand is brought away from the body, shown in Figure 5 in the appendix). The patient will also be instructed to perform these stretching techniques on herself using a cane or broomstick handle while laying down at home as part of a home exercise program. Full range of motion should be achieved from the patient within two to three weeks after beginning the stretching exercises. However, the patient should avoid lifting heavy objects, especially overhead, until at least five weeks postoperatively to avoid a shifting of the prosthesis. Previous energy levels should be regained within five to six weeks after surgery, allowing the patient to adequately perform her activities of daily living.

The postoperative physical therapy rehabilitation is roughly the same for the TRAM free flap as for both the single and double pedicled TRAM flap. The patient will be hospitalized for a few days after surgery (Zenn, 6). Within this time, the patient is placed in a flexed (bent forward) position at the waist to remove tension on the suture line. An upright position is allowed at the end of the first week. Arm and shoulder motions on the same side as the breast reconstruction are limited for the first two weeks

after surgery to protect the suture line (7). Abdominal exercises are not begun until at least six to eight weeks after surgery (Karp, 12).

Physical therapy for TRAM reconstruction is therefore suggested to begin two weeks postoperatively to start range of motion exercises for the shoulder. Rehabilitation for the shoulder follows the same range of motion exercises described for prosthetic reconstruction. In addition, the patient will be instructed by the physical therapist to practice correct walking patterns and postural education since the patient's abdominal incision (and the initial flexed position of the pelvis) may have caused her to hunch forward, having a bent-forward posture. The patient should practice these exercises and techniques all the time while walking.

Within the next two weeks (weeks three and four of physical therapy, five to six weeks after TRAM reconstruction surgery), the patient may begin some back exercises to stretch out the abdomen and strengthen the back muscles. Lower back pain is very common after TRAM reconstruction surgeries due to the bent-forward posture (Stumm, 4). Stretching out the abdomen and strengthening the back muscles will help straighten out the spine and relieve the back pain. One exercise the therapist can teach the patient is to have the patient lay face down on two overlapping pillows (Stumm, 4). The patient then lifts one leg and the opposite arm up off of the floor, holds it for 5 seconds, and then brings them back down simultaneously. The patient is then to repeat this motion with the other arm and leg (shown in Figure 6 in the appendix). This exercise builds muscle in the lower back because the back muscles must work to raise the arms and legs up off of the floor. Another back exercise that the patient can learn is to lay face down on top of two overlapping pillows again. The patient then raises her chest off of the floor and braces

herself on her elbows, as though she were on the floor reading the paper. She then breathes in slowly through the nose and then out through pursed lips for five seconds. Each time the patient blows out, she is instructed to relax her back and let it sag like a hammock (shown in Figure 7 in the appendix). The position stretches the abdomen. Finally, a third exercise for the patient is to have her lay on her back with her knees bent and arms down at her sides. The patient is then pushes her hips up into the air until the body is in a straight line from chin to kneecaps while the head and shoulders remain flat on the floor. When the hips are raised all the way up, the patient is instructed to count to five out loud so as not to hold her breath (shown in Figure 8 in the appendix). This final exercise strengthens the back muscles. These three exercises should be incorporated into the patient's home exercise program as well as in the clinic. The patient should work on these exercises for many weeks to maintain strength and relieve back pain.

Abdominal exercises can then be added to the patient's physical therapy routine at about five to six weeks (seven to eight weeks after the TRAM reconstruction surgery) (Zenn, 12). The therapist can teach the patient to perform abdominal curls to regain strength. The exercise consists of the patient laying on her back on the floor with her knees bent, feet flat on the floor, and arms at the sides (Hall, 77). The patient then tightens the abdominal muscles, tucks the chin slightly, and raises the trunk up until the shoulder blades leave the floor while keeping the head, neck, and shoulders in good alignment (shown in Figure 9B in the appendix). Over the next few weeks, the patient may progress the abdominal strengthening exercise to placing her arms across her chest while performing the movement (shown in Figure 9C in the appendix) and finally to

placing her hands on top of her head while performing the movement, each of which are of increasing difficulty (shown in Figure 9D in the appendix.

Throughout the weeks of therapy, the patient must adhere to a home exercise program in which she practices stretching and strengthening exercises at home each day, excluding the two days a week she attends physical therapy sessions. Exercises should be varied and progressed by the physical therapist as the weeks proceed. The patient is expected to regain prior energy level and resume normal activities within two to three months.

The latissimus dorsi flap reconstruction postoperative rehabilitation requires a limited use of the ipsilateral arm for the first two weeks and prohibited abduction of the arm for six weeks following the surgery, allowing the suture line to heal (Karp, 8). Physical therapy sessions should begin two weeks after surgery to begin shoulder range of motion exercises. The first two weeks of therapy (weeks three and four after surgery) should consist of the same shoulder stretching and range of motion exercises as for the prosthetic reconstruction rehabilitation, excluding the abduction exercise, which are brought into the therapy routine after the forth week of therapy (six weeks after surgery) (Karp, 8). Manual therapy and cane exercises are conducted in the same manner as in the TRAM rehabilitation.

At weeks five through six of therapy (seven to eight weeks after latissimus dorsi flap reconstruction surgery), exercises to strengthen the latissimus dorsi and surrounding muscles can be added to the therapy program. Strengthening of these muscles is warranted because a portion of the latissimus muscle was removed,, therefore weakening the donor site. The actions of the latissimus dorsi muscle are to extend the shoulder

(bring the shoulder towards the back), adduct the shoulder (bring the shoulder closer to the body), and medially rotate the shoulder (rotate the shoulder and arm towards the body) (Reese, 245). Therefore, strengthening exercises simulating these motions will strengthen the remaining latissimus dorsi muscle and the upper back muscles surrounding the latissimus dorsi to compensate for the original functional deficits. One exercise uses therabands, therapeutic resistance bands that resemble large rubber bands (different colors represent different resistance levels). For this exercise, the patient stands with her arms straight down at her sides. In the ipsilateral hand (the hand on the side of the surgery), the patient will grasp the end of a yellow theraband. The other end of the theraband will be tied to a doorknob or pole in front of the patient.. Therefore, while one end of the band is tied to a pole and the other is in the patient's hand, as the patient extends her shoulder (bringing the arm straight back from at her side), she receives resistance from the band and the extending motion is challenging to the latissimus dorsi and surrounding muscles (shown in Figure 10 in the appendix). In addition, the patient can, while still holding the theraband,, turn her whole body to the unaffected side and bend her elbow to a ninety degree angle (keeping her elbow at her side). The patient now can medially rotate her shoulder against resistance by pulling her hand gripping the theraband all the way to her chest and relaxing (shown in Figure 11 in the appendix). This motion against resistance serves as another exercise to help strengthen the latissimus dorsi and surrounding muscles. As the weeks progress, the patient can progress the strengthening exercises by using a stronger resistance theraband, from yellow to red to green and finally to black..

Throughout the weeks of physical therapy, the patient must follow a home exercise program in which she practices her stretching and strengthening exercises learned in the clinic. Even though therapy is twice a week, the patient must participate in exercises at home to keep progressing in her rehabilitation. Patients should resume their previous energy level and level of functioning after two to three months from surgery.

The gluteal free flap reconstruction procedure requires the patient to stay hospitalized for up to a week after surgery. Within the first few days, the hip is maintained in extension (the hip is extended backwards behind the body) to protect the gluteal sutures (Karp, 12). Within the next few days, the patient is gradually allowed to sit in a chair and eventually start walking.

Physical therapy rehabilitation for postoperative gluteal free flap reconstruction is therefore suggested to begin two weeks after surgery. The first two weeks of therapy (the third and fourth week after surgery) should consist of the same shoulder range of motion exercises as the prosthetic reconstruction postoperative therapy program. Likewise, the patient should practice the stretching exercises at home on the days she does not attend therapy. Gait (walking) training should be reviewed by the therapist with the patient repeatedly because the soreness of the buttocks may prevent the patient from fully bringing the ipsilateral leg forward while walking.

The next two weeks of therapy (post surgery weeks five and six) should focus on stretching the gluteus maximus. This can be done manually by the therapist and the therapist can also teach the patient to stretch the muscle on her own. This stretch is done by having the patient sit on the floor with both of her legs stretched out in front of her (longsitting). Then, the patient must cross the post surgical leg over her other leg with

the knee bent at a ninety-degree angle and directed toward the ceiling (shown in Figure 12A in the appendix). Once the patient masters this stretch, she can progress it by hugging her bent knee with her arms and holding for thirty seconds at a time (shown in Figure 12B in the appendix). This stretch should be practiced at home and in the clinic for the next four to five weeks.

The physical therapist should introduce strengthening exercises for the gluteus maximus (and surrounding muscles) during the next few weeks of therapy (weeks seven and eight after surgery). By this time, the muscle will be stretched but it will be weak due to a portion being removed during surgery. One exercise that a patient can perform to strengthen their gluteus maximus is chair squats (Hall, 408). This exercise requires a chair and a pillow (409). To start, the patient places the pillow on the seat of the chair. Then, standing in front of the chair (facing the other direction), the patient slowly lowers herself until her buttocks reaches the pillow on the seat of the chair and then she stands back up, never letting the full weight of her body touch the chair (shown in Figure 13A in the appendix). After a week or two, the patient can progress the exercise by removing the pillow (shown in Figure 13B in the appendix). Removing the pillow creates a deeper squat area for the patient, making the gluteus maximus and surrounding muscles work harder. Other exercises to strengthen the gluteus maximus are step-ups and step-downs. These exercises are performed by stepping up (or down), one foot at a time, onto (or off of) a six inch footstool. This exercise can be made more difficult by increasing the height of the footstool. The step-ups/step-downs can be performed to the front of the footstool or off to the side of the footstool for variation. Walking up and down stairs can also simulate this exercise.

Since only a portion of the gluteus maximus muscle is sacrificed for the reconstruction, the patient suffers only a minimal functional deficit at the donor site. For this reason, the patient should be able to resume everyday activities, such as jogging, within two to two-and-a-half months after surgery (Hutchenson, 70).

Complications can occur with any type of reconstruction. For autogenous tissue reconstructions, the most common complication at the donor site is the presence of seromas, a collection of fluid within a membrane (Kroll, 142). If the seroma is small, it will reso~ve spontaneously; if large, it will require repeated aspirations (removal of the liquid through a syringe by the doctor) to resolve. In either case, range of motion (stretching) and strengthening exercises are limited until resolution. The most common complication for prosthetic reconstruction procedures is a capsular contracture around the prosthesis (Boswick, 649). A capsular contracture is a fibrous thickening around the prosthesis that could contract and harden, squeezing the prosthesis. Therapeutic massage can help reduce the hardening but if the capsule is painful or distorts the prosthesis, the patient may have to undergo an additional surgery to release the capsule (Bredin, 1116). Lymphedema, , an accumulation of lymph in a tissue producing swelling, can occur at the recipient site (Surgery 101, Mastectomy: Postop and Recovery). This causes a swelling in the ipsilateral arm. Therapeutic massage, moderate exercise (as prescribed by the therapist), and elevation of the affected arm can help alleviate this complication.

It is important to recognize that all patients have varying healing times, pain tolerances, and emotional considerations. Although physical therapy rehabilitation guidelines can be set according to general recovery times, each individual patient

progresses at their own speed. Various complications can hinder and set back the rehab process and so their individual therapy routines must be modified accordingly.

Breast reconstructions following mastectomies can be very fulfilling to breast cancer survivor patients. It can help them move on with their lives feeling physically complete and feeling that they have put the disease behind them. Physical therapy is an important part of the recovery and rehabilitation process for these patients because appropriate exercises and techniques are tailored to each specific type of reconstruction. These routines help guide patients safely through their recovery processes.

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Figure 1

Forward Flexion

A. Starting Position

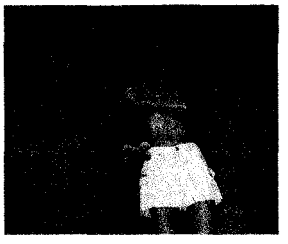
B. Ending Position

Figure 2

Abduction

A. Starting Position

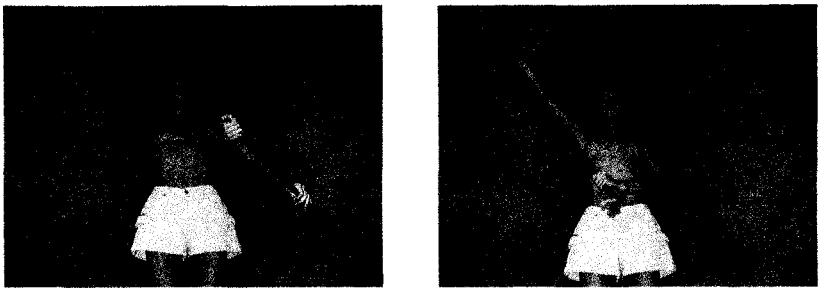
B. Mid-Position



C. Ending Position

Figure 3

Diagonal



A. Starting Position

B. Ending Position

Figure 4

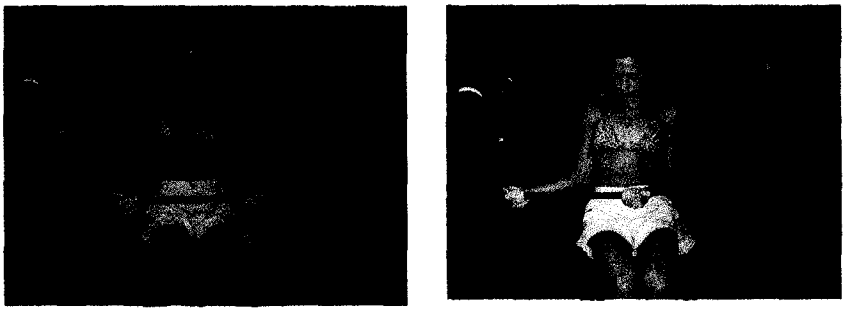
Internal Rotation

A. Starting Position

B. Ending Position

Figure 5

External Rotation



A. Starting Position

B. Ending Position

Figure 6

Opposite Arm and Leg Lift

A. Relaxed Position

B. Position One
Right Arm, Left Leg

C. Position Two
Left Arm, Right Leg

Figure 7

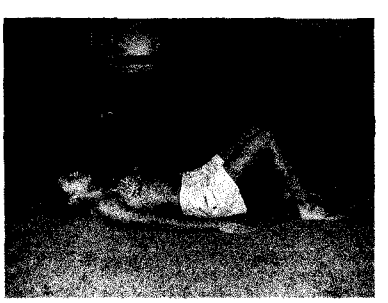
Back Stretch from Elbows

A. Starting Position

B. Ending Position

Figure 8

The Bridge



A. Starting Position

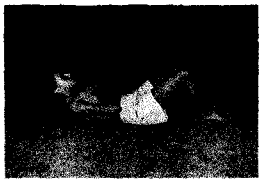
B. Ending Position

Figure 9

Abdominal Curl Progressions

A. Relaxed Position

B. Progression One
Arms at sides



C. Progression Two
Arms across chest

D. Progression Three
Arms behind head

Figure 10

Strengthening Shoulder Extension

A. Starting Position

B. Ending Position

Figure 11

Strengthening Shoulder Internal Rotation

A. Starting Position

B. Ending Position

Figure 12

Gluteal Stretching Exercise Progressions

A. Progression One

Leg cross

B. Progression Two

Leg cross hugged against chest

Figure 13

Chair Squat Progressions

A. Progression One
Chair squat with pillow

B. Progression Two
Chair squat without pillow

SUBJECT CONSENT FORM

I agree to participate in the research project titled "Musculoskeletal Rehabilitation for Breast Cancer Post-Reconstruction Surgeries" being conducted by Kristin Arialis, under the advisory of Dr. Nancy Nuzzo at Northern Illinois University. I have been informed that the purpose of this study is to educate others on a proposed set of musculoskeletal rehabilitation protocols for the different types of post-reconstruction surgeries for breast cancer patients.

I understand that ifI agree to participate in this study, I will be asked to pose for photo shoots of different musculoskeletal rehabilitation exercises.

I am aware that my participation is voluntary and may be withdrawn at any time without penalty or prejudice, and that ifI have any additional questions concerning this study, I may contact Kristin Arialis at (708) 466-7444 or Dr. Nancy Nuzzo at (815) 753-6245. I understand that if I wish further information regarding my rights as a research subject, I may contact the Office of Research Compliance at Northern illinois University at (815) 753-8588.

I understand that the intended benefit of this study is educating people on breast reconstruction rehabilitation and recovery.

I have been informed that the potential risk and/or discomfort I could experience during this study is discomfort performing various positions or exercises for the photo shoot.. I understand that all information gathered during this experiment will be kept confidential; my photos will only be used in the context of this research paper..

I realize that Northern illinois University policy does not provide for compensation for, nor does the University carry insurance to cover injury or illness incurred as a result of participation in University sponsored research projects.

I understand that my consent to participate in this project does not constitute a waiver of any legal rights or redress I might have as a result of my participation, and I acknowledge that I have received a copy of this consent form.

[redacted] 9/26/12

Subject Signature and Date